

REMARKS

Claims 31-35, 37 and 39-43 are pending in the application. Claims 31-35, 37 and 39-43 are rejected. Applicant has considered the outstanding official action. It is respectfully submitted that all of the claims are directed to patentable subject matter as set forth below and are in condition for allowance.

Claim 41 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Applicant has amended claim 41 to clarify what is claimed and to address the matter referred to by the Examiner. Withdrawal of the § 112 rejection is respectfully requested.

Claims 31-35, 37 and 39-43 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 3,274,033 (Jacke) in view of U.S. Patent No. 5,352,305 (Hester). Applicant respectfully submits that Jacke and Hester, alone or in combination, fail to teach or suggest the claimed invention. Withdrawal of the § 103 rejection is respectfully requested.

Claims 31 and 37 are the only independent claims. Claim 31 is directed to a reworked metallic braking rotor or drum having a braking surface adapted to engage a brake pad or brake shoe, respectively, in dry sliding contact and frictional loading characterized in an initial manufacturing

process by presence of residual tensile stresses and tooling mark indentations in the braking surface comprising an ultrasonically reworked braking rotor or drum presenting a smoothed plastically deformed braking surface introducing increased braking surface contact area. The claimed invention is further directed to a braking rotor or drum having a compressed sub-surface layer on the braking surface establishing increased wear resistance properties; a machined surface established by ultrasonic impact machining with a set of individual randomly ultrasonically driven indenter elements; and/or the smoothed plastically deformed braking surface has a roughness not exceeding 200 micro-inches.

Claim 37 is directed to an ultrasonically reworked metallic braking rotor or drum having a plastically deformed, smoothed and compressed braking surface. The claimed invention is further directed to a reworked braking rotor or drum having a surface roughness of less than 200 micro-inches; a uniform stress profile under the braking surface to a depth of 12 mm, thereby ensuring uniform deformation eliminating stress concentration at the surface and reducing possibility of crack development; the braking surface being cast iron with a strength exceeding the yield point of the cast iron prior to reworking; the braking

surface having a surface of higher contact area for abutment with the brake lining; and/or the braking surface having a smoother surface finish with better contact surface area with the applied brake lining during operation resulting in less heat build up during brake application providing more efficient braking and a safer application of the brake.

Jacke teaches relieving residual stresses in a solid material by contact introduction of ultrasonic energy into the solid material. Jacke provides ultrasonic energy at a frequency of 20 kHz directly to the solid material, i.e., at the resultant frequency of the ultrasonic transducer. The ultrasonic tool is required to be pressed against the solid material under hard pressure to obtain the sought after results. Thus, Jacke teaches weld high intensity sonic transient or shock waves to reduce forces between adjacent grains of metal so that they can rotate relative to each other and reduce the residual stresses (col. 2, line 70 - col. 3, line 7).

Jacke does not teach or suggest a reworked metallic braking rotor or drum or an ultrasonically reworked metallic braking rotor or drum as claimed. Accordingly, Jacke does not teach or suggest each and every element of the claimed invention. Jacke is applied in combination with Hester. Hester does not overcome the deficiencies of Jacke

as set forth above. Hester teaches inducing uniformly distributed compressive stresses in machined surfaces of brake drums and rotors by a metal treating process, such as shot peening, to improve the characteristics and performance of the brake drums and rotors. As acknowledged by the Examiner, Hester does not teach or suggest an ultrasonically reworked braking rotor or drum. Further, no motivation is provided by Hester to modify the invention taught therein in order to obtain the claimed invention. For example, Hester teaches prestressing the machined surface of a brake drum (such as by shot peening which leaves a roughened surface) to induce compressive stresses in the machined surface (column 2, lines 18-20), and that if enough compressive stress is induced, the residual surface tensile stresses are totally canceled resulting in reduction of heat checking and the increase in fatigue resistance (column 2, lines 24-28). Jacke teaches using ultrasonics to relieve residual stresses, i.e., tensional stresses and compressive stresses, in weldments. These residual stresses are stated to produce net weakening of the welded structures (column 1, lines 9-17). Thus, neither Jacke nor Hester teaches or suggests modification of the teachings therein to provide an ultrasonically reworked braking drum or rotor with a smoothed plastically deformed braking surface.

Accordingly, applicant respectfully submits that Jacke, either alone or in combination with Hester, does not render the claimed invention obvious within the meaning of 35 U.S.C. § 103. Withdrawal of the § 103 rejection is respectfully requested.

Applicant is submitting herewith a supplemental application data sheet. Applicant is no longer claiming small entity status.

Reconsideration and allowance of the claims is respectfully requested.

Respectfully submitted,

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Attachment: Supplemental Application Data Sheet